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This study investigated variations in the relationship between age strata and career roles of faculty affiliated with eight distinctive clusters of academic disciplines in major research universities. The sample consisted of over 10,000 faculty who responded to a recent American Council on Education survey. The results demonstrated wide variation in the relationship between age and career roles of faculty in the discipline clusters, and raise serious questions regarding several commonly assumed trends in the career roles of faculty during various stages of their tenure in the academic community. (Author)

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CAREER ROLES OF RESEARCH UNIVERSITY FACULTY

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The renewed interest in research on professionals in the academic community has produced an increasingly rich litereature on the dominant patterns of faculty interests, values, and activities and the salient sources of diversity in these attitudinal and behavioral patterns. Through such efforts we are beginning to acquire a better understanding of the prevailing value structure in the academic community and how this varies as a function of the academic discipline and institutional affiliations of faculty.

Until recently, however, the effects of faculty aging have received little attention in the higher education research literature. This neglect has been so pronounced that Zuckerman and Merton (1972) have claimed that "just about any methodical research on age, age cohorts, and age structure in science would qualify, through prior default, as a 'new' direction" (p. 496). The subject of faculty aging has recently begun to capture greater attention of researchers with the reversal of the enrollment growth trends of the past two decades and the resulting need to rethink existing faculty recruitment, retention, and employment practices in the current climate of "steady-state staffing." Recent literature reviews by Carlsson and Karlsson (1970) and Bess (1973) and empirical research by Bayer and Dutton (1977) reflect the emerging interest in this area of scholarly inquiry.

With the notable exception of the study by Harmon (1965), the relationship between the age and the primary career roles of faculty has not been systematically examined. Harmon (1965) reported that (a) younger faculty are more likely than their senior colleagues to devote more of their time to research activities, (b) senior faculty are far more likely to specialize in administrative roles, and (c) age differences concerning the teaching roles of faculty are less pronounced than those related to either research or administrative roles. The

possibility of variations in these prevailing relationships for faculty in different academic disciplines was not examined by Harmon (1965).

This study represents a reexamination of the general findings reported by Harmon (1965) and further seeks to examine the validity of these general findings for faculty affiliated with distinctly different clusters of academic disciplines. The study is conducted within the conceptual framework advanced by Zuckerman and Merton (1972) in their notable review of the literature on age differentiation in science. The three basic components of the framework are age differentiation, scientific roles, and the codification of subject matter areas. The former pertains to age differences in the entry, retention, and exit patterns of scientists, as well as their educational attainment and professional role performance. Scientific roles concern the distribution of scientists' efforts among the fourfold responsibilities of research, teaching, administration, and gatekeeping. The concept of subject matter area codification refers to variations in the extent to which empirical knowledge is consolidated into succinct and interdependent theoretical formulations in various sciences and their respective specialties (i.e., disciplines and sub-disciplines). This study focuses upon the interrelationships of these three primary components of the conceptual framework advanced by Zuckerman and Merton (1972); that is to say, the extent to which the relationship between age and scientific roles of faculty varies as a function of the level of codification of various academic disciplines.

DATA SOURCE AND METHOD

Data for this study were obtained from the American Council on Education (ACE) survey of college and university faculty members (Bayer, 1973). From this sample of 53,029 faculty members, those selected for analysis were men and women affiliated with large research universities (Research Universities I and

II of the Carnegie Commission typology of postsecondary institutions) whose highest earned degree was a doctorate and whose highest earned degree field and department of teaching appointment was included in the three-dimensional model of academic disciplines developed by Biglan (1973b). Only faculty from large research universities were selected since these institutions normally expect (and provide opportunities for) their faculties to be engaged in all the major career roles (i.e., research, teaching, administration) within the academic profession.

The concept of codification advanced by Zuckerman and Merton (1972) bears a close resemblance to the concept of paradigm developed by Kuhn (1970). The concept of paradigm is a major feature in Biglan's (1973b) three-dimensional model of academic disciplines (shown in Figure 1), and subsequent research by Biglan (1973a), Lodahl and Gordon (1972), and Smart and Elton (1975) has demonstrated its value in studying the structure of academic disciplines and the activities and values of their members. Thus, Biglan's model was used to identify distinctive clusters of academic disciplines for subsequent analyses.

(Insert Figure 1 about here)

Data relating to the age and career roles of faculty were obtained from responses to the following items in the ACE survey: age was reported in one of ten five-year interval categories (with the exception of the beginning and ending age categories) and subsequently reduced to three major age categories (40 or less, 41 to 50, 51 and older) and primary career role to which faculty responded that the principal activity of their current position was either administration, teaching, research, or other (the 'other' category was not retained for analyses). Chi-square analyses were performed to examine dif-

ferences between age and primary career role distributions of faculty in each of the eight academic discipline groups included in Biglan's model (see Figure 1).

RESULTS

Tables 1 through 8 present the expected and actual distributions from the chi-square analyses for the age category and primary career role variables for faculty in each of the eight academic discipline clusters included in Biglan's model. For ease of interpretation, Table 9 presents summary information on the differences between the expected and actual distributions for the three age categories (40 or less, 41 to 50, 51 or more) in each primary career role for faculty in the eight academic discipline clusters. For example, Table 9 shows that there are 25 per cent fewer young faculty (40 or less) than expected in the administrative role in HPL disciplines (biological sciences), 8 per cent more middle-age faculty (41 to 50) than expected, and 16 per cent more senior faculty (51 or more) than expected. These three percentages do not always seem to zero because of rounding error.

Insert Tables 1 through 9 about here

The following is a summary of the results presented in TAble 9 for the distribution of the three age groups in each of the three primary career roles.

Administrative Role. The information in Table 9 clearly demonstrates that the administrative role is not the province of younger faculty, for in all eight discipline clusters there are fewer young faculty than expected who indicated that their principal role was administration. However, the magnitude of this disproportionately lower representation of younger faculty in the administrative role varied dramatically from 2 per cent in SAL disciplines (Education) to 27 per cent in HPL disciplines (physical sciences and mathe-

matics). Younger faculty clearly have a better opportunity of engaging primarily in administrative responsibilities in Education (SAL) disciplines than in any other discipline cluster.

Yet to say that younger faculty are consistently 'underrepresented' in the administrative role does not necessarily mean that senior faculty are consistently 'overrepresented', as suggested by Harmon (1965). We find, for example, in all four 'soft' discipline clusters that the 'underrepresentation' of younger faculty is offset by approximately equal 'overrepresentation' of both middle-age and senior faculty. This suggests that opportunities to engage primarily is administrative tasks becomes available to faculty in 'soft' disciplines somewhere around the age of forty. On the other hand, the administrative role is primarily the province of senior faculty in three of the four 'hard' disciplines (HPL, HPN, HAL). The only exception is in HAN disciplines (engineering sciences) where middle-age faculty are far more dominant than their senior colleagues.

Teaching Role There is clearly less variation in the expected and actual frequencies in the teaching role than in either the administrative or research role. The largest discrepancy between the expected and actual frequencies (4 per cent) is in HAL disciplines (agricultural sciences), and the direction of this difference is somewhat unique; that is, there is a slightly greater percentage of senior faculty whose primary activity is teaching than normally would be anticipated. The differences, in all eight discipline clusters, however, is negligible.

Research Role. If the administrative role is decidedly not the province of younger faculty, the reverse is true in terms of the research role, for in all eight discipline clusters there are more young faculty who are principally engaged in research activities than expected. Again, however, the

magnitude of this 'overrepresentation' of younger faculty in the research role varies substantially among the eight discipline clusters, from 3 per cent in SPL (social sciences) and SPN (humanities) disciplines to 14 per cent in HAN disciplines (engineering sciences). Furthermore, it is not always the senior faculty who are disproportionately 'underrepresented' in the research role. The 'underrepresentation' of senior faculty in the research role is evident in only four of the eight discipline clusters (HPL, HAL, SPL, SAN). In fact, senior faculty are substantially 'overrepresented' in the research role in SAL disciplines (Education) and not as 'underrepresented' as their middle-age colleagues in the three remaining discipline clusters (HPN,HAN,SPN).

CONCLUSIONS

The failure of researchers to investigate the possibility of academic discipline variability can often lead to the formulation of universal conclusions regarding the prevailing interests, values, and activities of members of the academic profession. While such conclusions, on the whole, may be true, their applicability to faculty in specific academic disciplines may be unwarranted. This, in essence, describes the relationship of the finding of this study and those reported by Harmon (1965). Harmon's findings are essentially substantiated by the results of this study if one ignores the academic discipline affiliation of faculty members. That is to say, more senior faculty tend to specialize in administrative roles, younger faculty tend to specialize in research roles, and age differences in the teaching role are less pronounced than those related to either research or administrative roles. Yet such universal conclusions are too simplistic and tend to mask wide variations among distinctively different academic discipline clusters, and it is this variability, rather than the similarity, that is most descriptive of the academic community.

Zuckerman and Merton (1972) note that "what is role-sequence from the standpoint of the individual moving along the phases of his life course is role-allocation from the standpoint of the social system of science" (p. 523). And it is this distinctive role-allocation process in each of the eight academic discipline clusters included in Biglan's model that deserves further attention on the part of researchers interested in the sociology of careers in the scientific community. Based on the underlying dimensions of Biglan's model, the results of this study suggest that the level of subject matter area codification advanced by Zuckerman and Merton (1972), and similar to the concept of paradigm developed by Kuhn (1970), is closely related to the allocation of administrative roles in the scientific community. The findings discussed above suggest that the allocation of administrative responsibilities in subject areas that have a higher degree of codification ('hard' disciplines) are reserved for senior faculty, while 'soft' disciplines, which have a lower level of codification and paradigm development, provide opportunities to engage principally in administrative roles to faculty of middle-age (or mid-career). The underlying reasons for this variability in the relationshiop between age differentiation and subject matter area codification clearly warrant further study. One might also want to examine why the engineering sciences (HAN) are different from the other 'hard' disciplines in this respect.

Similarly, the third dimension of Biglan's model (life-system vs.nonlife-system disciplines) appears to be related to the allocation of the research role opportunities in the scientific community. The prevailing tendency is that senior faculty are especially 'underrepresented' in the research role of 'life-system' disciplines (particularly in the biological sciences, HPL; agricultural sciences, HAL; and social sciences, SPL), while this is not as

pronounced in most 'nonlife-system' disciplines (particularly in the physical sciences and mathematics, HPN; engineering sciences, HAN; and humanities, SPN).

Another area that deserves greater attention is the unusual relationship between age differentiation and role allocation in Education disciplines (SAL). For example, unlike all other seven discipline clusters, the opportunity to engage in administrative role activities in Education disciplines is almost totally unrelated to the age of faculty members. Also, the relationship between faculty age and opportunities to engage primarily in research role activities of faculty in Education disciplines is atypical; that is, the research role is reserved for (i.e., allocated to) faculty in the two extreme age categories (40 or less, 51 or more). This unusual pattern warrants further study.

In summary, there are many intriguing questions regarding the relationship between age differentiation and role allocation in the academic community that deserve further attention. The results presented above clearly suggest the advisability of incorporating the academic discipline affiliations of faculty into research designs in this area of scholarly inquiry since the relationship between age differentiation and role allocation is likely to vary in different academic disciplines. It is further suggested that Biglan's model constitutes a desirable conceptual framework for the clustering of academic disciplines.

Figure 1

Clustering of Academic Task Areas in Three Dimensions

Task area	Hard		Soft	
	Nonlife system	Life system	Nonlife system	Life system
Pure	Astronomy Chemistry Geology Math Physics	Botany Entomology Microbiology Physiology Zoology	English History Philosophy Communications	Anthropology Political science Psychology Sociology
Applied	Ceramic Engineering Civil engineering Computer science Mechanical engineering	Agronomy Dairy science Horticulture Agricultural economics	Accounting Finance Economics	Educational administration & supervision Secondary & continuing education Special education Vocational and technical education

Table 1

Age Strata and Primary Career Role Distributions:
HPL Discipline Cluster (Biological Sciences)

Primary Career Role	Age Strata			TOTAL
	40 or less	41-50	51 or more	
Administration				
Actual	21	73	78	172
Expected	63	58	50	
Teaching				
Actual	275	235	214	724
Expected	266	246	212	
Research				
Actual	197	148	101	446
Expected	164	152	131	

Table 2

Age Strata and Primary Career Role Distributions:
HPN Discipline Cluster (Physical and Mathematical Sciences)

Primary Career Role	Age Strata			TOTAL
	40 or less	41-50	51 or more	
Administration				
Actual	72	123	131	326
Expected	160	92	75	
Teaching				
Actual	1123	651	497	2271
Expected	1112	638	521	
Research				
Actual	436	162	136	734
Expected	359	206	168	

Table 3

Age Strata and Primary Career Role Distributions:
HAL Discipline Cluster (Agricultural Sciences)

Primary Career Role	Age Strata			TOTAL
	40 or less	41-50	51 or more	
Administration				
Actual	12	37	62	111
Expected	37	36	38	
Teaching				
Actual	75	78	93	246
Expected	81	81	84	
Research				
Actual	176	146	118	440
Expected	145	144	151	

Table 4
Age Strata and Primary Career Role Distributions:
HAN Discipline Cluster (Engineering Sciences)

Primary Career Role	Age Strata			TOTAL
	40 or less	41-50	51 or more	
Administration				
Actual	21	29	16	66
Expected	38	18	9	
Teaching				
Actual	256	112	56	424
Expected	245	118	61	
Research				
Actual	35	9	5	49
Expected	28	14	7	

Table 5
Age Strata and Primary Career Role Distributions:
SPL Discipline Cluster (Social Sciences)

Primary Career Role	Age Strata			TOTAL
	40 or less	41-50	51 or more	
Administration				
Actual	39	73	65	177
Expected	79	51	47	
Teaching				
Actual	497	275	261	1033
Expected	460	298	275	
Research				
Actual	56	36	28	120
Expected	53	35	32	

Table 6

Age Strata and Primary Career Role Distributions:
SPN Discipline Cluster (Humanities)

Primary Career Role	Age Strata			TOTAL
	40 or less	41-50	51 or more	
Administration				
Actual	41	80	89	210
Expected	94	55	62	
Teaching				
Actual	754	388	434	1576
Expected	702	412	462	
Research				
Actual	20	10	13	43
Expected	19	11	13	

Table 7

Age Strata and Primary Career Role Distributions:
SAL Discipline Cluster (Education)

Primary Career Role	Age Strata			TOTAL
	40 or less	41-50	51 or more	
Administration				
Actual	25	50	57	132
Expected	28	49	55	
Teaching				
Actual	34	58	58	130
Expected	32	56	62	
Research				
Actual	4	2	7	13
Expected	3	5	5	

Table 8

Age Strata and Primary Career Role Distributions:
SAN Discipline Cluster (Business)

Primary Career Role	Age Strata			TOTAL
	40 or less	41-50	51 or more	
Administration				
Actual	35	52	52	139
Expected	60	38	41	
Teaching				
Actual	319	177	209	705
Expected	303	194	208	
Research				
Actual	78	48	35	161
Expected	69	44	47	

Table 9

Summary of Differences Between Actual and Expected Row Percentages for the Eight Academic Discipline Clusters (Tables 1-8)

Age Strata within each Primary Career Role	Academic Discipline Clusters							
	HPL	HPN	HAL	HAN	SPL	SPN	SAL	SAN
ADMINISTRATION								
40 or less	-25	-27	-22	-26	-23	-25	- 2	-18
41-50	+ 8	+10	+ 1	+17	+12	+12	+ 1	+10
51 or more	+16	+17	+22	+10	+10	+12	+ 1	+ 8
TEACHING								
40 or less	+ 1	0	- 3	+ 2	+ 3	+ 3	- 3	+ 2
41-50	- 2	+ 1	- 1	- 2	- 2	- 1	+ 2	- 3
51 or more	+ 1	- 1	+ 4	- 1	- 2	- 1	+ 2	0
RESEARCH								
40 or less	+ 7	+10	+ 7	+14	+ 3	+ 3	+ 8	+ 5
41-50	- 1	- 6	0	-11	+ 1	- 3	-23	+ 3
51 or more	- 6	- 4	- 7	- 4	- 4	0	+16	- 7